NASA Procedural Requirements

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CHAPTER 4. Basic and Applied Research Portfolios

4.1 Four-Part Portfolio Management Process

4.1.a Basic research addresses the need for knowledge, while applied research directs this new knowledge toward a practical application. Basic and applied research is directly tied to the Agency Vision and strategic goals. The results of this research may expand the knowledge base, may provide scientific and technological breakthroughs that are immediately applicable, or may evolve into an advanced technology development (ATD).

4.1.b Basic and applied research investments are typically carried out under programs associated with Themes, and are managed as portfolios of investigations, sometimes organized and managed as a project. A portfolio consists of one or more investigations. Each investigation is managed by a Principal Investigator (PI), who has been selected from NASA, academia, industry, non-profit organizations, or State and local governments normally through a competitive process and peer review. These investigations are characterized by unpredictability of outcome, high risk, and funding usually at a fixed level on a yearly basis. The progress and relative value of such investigations are continually assessed, and the portfolio is adjusted accordingly. The basic and applied research portfolio lifecycle is shown in Figure 4-1. Because of the unique features of basic and applied research, management processes differ substantially from those used for traditional project management. Consequently, the requirements of Chapter 3 are replaced by the requirements in this chapter.

4.1.c NASA management practices for basic and applied research are intended to assure that portfolios reflect the probability of success since success or a certain outcome cannot be guaranteed.[32] NASA management practices are also intended to assure that, over time, NASA-funded portfolios are highly productive, based on qualitative and quantitative evaluations. Basic and applied research portfolios strive for quality and relevance to the NASA Vision and strategic goals. Not all research investigations will be successful, but most will result in knowledge and discoveries from which new opportunities will flow. Further, research portfolios and investigations are intended to be flexible, and have the ability to be assimilated or infused into current or new research, decision support and other information systems, technology application, or ATD projects in NASA and other agencies to take advantage of innovation and improve the competitive position of domestic industries.

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[32] Balance must also reflect the different scientific and technology disciplines that must be supported, and the appropriate mix of intramural and extramural funding.

4.1.d The primary mechanisms for assuring quality in basic and applied research are open competition and peer review, where peer review means independent evaluation by internal or external subject matter experts who do not have a conflict of interest. NASA solicits most basic and applied research proposals for investigations through three forms of Broad Agency Announcements (BAA)--NASA Research Announcements (NRA), Announcements of Opportunity (AO), and Cooperative Agreement Notices (CAN). Proposals are evaluated for relevance to the NASA Vision and strategic goals; scientific, engineering, technical, programmatic or educational merit; and cost realism,

cost reasonableness, and cost performance history.

4.1.e This chapter establishes requirements for the Portfolio Manager using the four-part management process of paragraph 1.7.1. The Portfolio Manager operates under the requirements of this chapter, NPD 1080.1, *NASA Science Policy,* NPR 1080.1, *Science Management,* NASA procurement regulations such as the NASA FAR Supplement, Agency-level agreements with partners, Mission Directorate Handbooks, the Guidebook for Proposers to NASA Research Announcements, and the criteria identified in research solicitations such as the annual Research Opportunities in Space and Earth Sciences (ROSES).

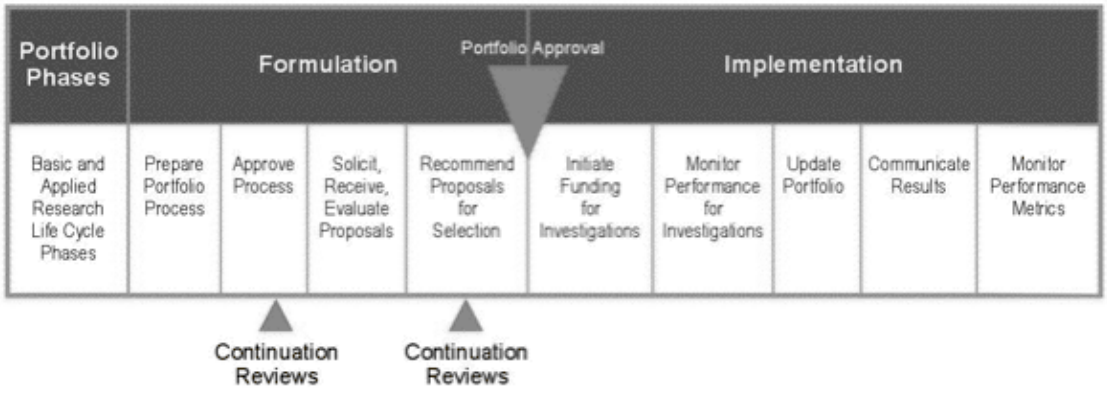

Figure 4-1 Basic and Applied Research Portfolio Lifecycle

4.2 Portfolio Formulation

4.2.a In portfolio formulation, the Portfolio Manager builds a collection of research investigations that supports the NASA Vision, strategic goals, Theme objectives, and program goals, and which can be successfully conducted within available resources and applicable constraints. Portfolio formulation is initiated when a portfolio (project-equivalent) Formulation Authorization Document (FAD) (or equivalent such as a Program Plan section) is signed, and a Portfolio Manager is designated by the MDAA (or MSOD) and the Program Manager.

4.2.b During formulation, the Portfolio Manager performs and orchestrates the following activities:

a. Portfolio process planning
b. Proposal solicitation, evaluation, and selection.

4.2.1 Portfolio Planning Requirements: The MDAA- or MSOD-designated Portfolio Manager shall:

4.2.1.a Prepare a Portfolio Process Plan.

1. At a minimum, the Portfolio Process Plan shall:

i. Define and document portfolio objectives that support Agency, Theme, and program goals. The Portfolio Manager coordinates with the cognizant MDAA (or MSOD) and Program Manager.
ii. Define a process for the solicitation, evaluation, and selection of proposals (including identifying Selection Official(s)).
iii. Establish evaluation criteria including considerations of quality, relevance to NASA missions and strategic goals, and performance.
iv. Include an integrated portfolio budget typically for three or five years (including appropriate WBS elements).
v. Include a multi-year schedule for the portfolio.
vi. Include portfolio evaluation processes.

2. Create a management and control structure to implement the Portfolio Process Plan.

4.2.1.b Obtain approval of the Portfolio Process Plan. The Portfolio Manager shall forward the Portfolio Process Plan to the Program Manager for approval.

4.2.2 Proposal Solicitation, Evaluation, and Selection Requirements: The Portfolio Manager shall:

4.2.2.a Initiate solicitation and receipt of proposals through the issuance of a Broad Agency Announcement following

the process established in the approved Portfolio Process Plan. Prospective PIs participate in portfolio formulation by preparing and submitting proposals in response to a solicitation. Research proposals for individual investigations include proposed research designs, budgets, schedules, and expected outcomes.

4.2.2.b Using peer review processes established in NPR 1080.1, Science Management, evaluate proposals based on the criteria established in the solicitation.

4.2.2.c Recommend proposals for selection. Specifically, the Portfolio Manager shall:

1. Review findings from peer review and other factors, and recommend selections for approval by the Selection Official.
2. Include the rationale for selection or non-selection of each proposal evaluated.
3. Include a description of all research activities within the portfolio including activities that are continued from previous years.

4.3 Portfolio Approval

4.3.1 The MDAA (or MSOD) through the designated Selection Official shall review the recommendations and supporting information, and if acceptable, approve the selection of investigations for award.

4.4 Portfolio Implementation

4.4.1. Purpose: During portfolio implementation, the Portfolio Manager monitors the performance of investigations selected for inclusion in the portfolio, and adjusts the portfolio composition following evaluation, usually on a cyclical basis until the portfolio is terminated.

4.4.2 Requirements: The Portfolio Manager shall:

4.4.2.a Initiate funding for selected investigations.

4.4.2.b Update the portfolio to include the specific details of the new research investigations that have been selected.

4.4.2.c Encourage PIs to communicate their results through activities such as:

1. Submitting progress reports (at least on an annual basis) that summarize research results to date.[33]
2. Publishing research results in peer-reviewed publications, participating in scientific and technical society meetings, major conferences, workshops, and carrying out other similar efforts.

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[33] Final reports for investigations funded through grants and contracts are archived in the NASA Scientific and Technical Information System, as specified in NPR 2200.2, *Requirements for Documentation, Approval, and Dissemination of NASA Scientific and Technical Information.*

4.4.2.d Maintain and report performance metrics in electronic form as required by NPR 1080.1, Science Management, and report it to the NASA Office of the Chief Scientist (OCS).

4.5 Portfolio Evaluation

4.5.1 Purpose: Portfolio evaluation assesses whether the portfolio is contributing to the NASA Vision, Theme and program goals, and is being successfully executed according to the approved Portfolio Process Plan. Portfolio evaluation results in recommendations for enhancing the portfolio's performance.

4.5.2 Requirements: Evaluation is a multi-level process in which the Portfolio Manager shall:

4.5.2.a Evaluate investigations within a portfolio largely during peer review following solicitation and during performance of the investigation by review of progress reports submitted by the PI during implementation.

4.5.2.b Review portfolio scope annually, describe changes in portfolio scope in solicitations, and report changes in annual evaluations.

4.5.2.c Provide information to support evaluation of portfolio performance as specified in the Program Plan.

4.5.3 The outcome of a portfolio evaluation can be continuation, continuation with changes, or termination.

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